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Sensitivity to change in the Obsessive Compulsive Inventory: comparing the standard and revised versions in two cohorts of different severity

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Abstract

The Obsessive Compulsive Inventory (OCI) is often used as a screening instrument for symptoms of obsessive-compulsive disorder (OCD) and as an outcome measure for treatment. Three versions of the OCI are available: the original 42-item version, the revised 18-item version (OCI-R) and a shorter version that focuses on the highest subscale (OCI-R Main). Our aim was to determine sensitivity to change and evaluate cut-off scores for caseness in each version of the OCI using the same dataset. Method: We compared the effect size and the number of patients who achieved reliable and clinically significant change after cognitive behavior therapy in two samples of out-patients with OCD. One sample (n = 63) had OCD of minor to moderate severity and a second sample (n = 73) had severe, treatment refractory OCD. Results: In both samples, the OCI and OCI-R had very similar treatment effect sizes and to a lesser extent in the percentage who achieved reliable improvement and clinically significant change. The OCI-R Main was more sensitive to change than the OCI or OCI-R in both samples. All versions of the OCI were less sensitive to change compared with the Yale-Brown Obsessive Compulsive Scale (Y-BOCS). Discussion: The OCI-R is a valid self-report outcome measure for measuring change and is less burdensome for patients to complete than the OCI. Questions remain about whether the OCI or OCI-R is sufficiently sensitive to change for a service evaluation. We would recommend a slightly higher cut-off score of ≥17 on the OCI-R for the definition of caseness.

Keywords: obsessive compulsive disorder; obsessive compulsive inventory; psychometrics; cognitive behavior therapy

Sensitivity to change in the Obsessive Compulsive Inventory: comparing the standard and revised versions in two cohorts

The Obsessive Compulsive Inventory (OCI) is a self-report screening questionnaire to identify symptoms of obsessive-compulsive disorder (OCD) and for measuring outcome after treatment (Foa, Kozak, Salkovskis, Coles, & Amir, 1998). It is a 42-item instrument which was introduced to assess a more comprehensive range of symptoms compared with older self-report measures such as the Compulsive Activity Checklist (Marks, Hallam, Connolly, & Philpott, 1977) or the Maudsley Obsessive Compulsive Inventory (Hodgson & Rachman, 1977). The authors subsequently developed the OCI-Revised (OCI-R), which is a shorter 18-item version derived from the original 42 items (Foa et al., 2002). Both the standard OCI and OCI-R have been shown to be reliable and valid measures of OCD (Abramowitz, Tolin, & Diefenbach, 2005; Sica et al., 2009). Randomized controlled trials of cognitive behavior therapy (CBT) for OCD have used the OCI (Rowa et al., 2007) and the OCI-R (Andersson et al., 2012). However there are no identifiable RCTs or case series of pharmacological interventions that have used the OCI or OCI-R.

Another important role for the OCI is for evaluation of a clinical service. One national service that has adopted the standard OCI is the Improving Access to Psychological Therapies (IAPT) service in the UK. It is an ambitious program designed to expand the availability of evidence based psychological therapies within the state National Health Service (Clark et al., 2009). The IAPT service includes CBT for OCD, which is commonly delivered weekly over 12-15 sessions. Some services also deliver self-help or computerized CBT for OCD supported by a Psychological Wellbeing Practitioner, usually over the telephone. A few patients may have medication for OCD optimized by their family doctor but this is not the focus of the service. A minimum data set of standardized outcome measures is

required for all IAPT services, which allows weekly monitoring of progress. Thus, all patients within IAPT services complete a dataset of weekly measures including: (a) the Patient Health Questionnaire (PHQ-9) (Lowe, Kroenke, & Herzog, 2004), (b) the Generalised Anxiety Disorder questionnaire (GAD-7) (Spitzer, Kroenke, Williams, & Löwe, 2006), (c) the IAPT Phobia Scales (IAPT, 2008), (d) the Employment and Benefit Status (IAPT, 2008), and (e) the Work and Social Adjustment Scale (Mundt, Marks, Shear, & Greist, 2002). The advantage of weekly measures is that it enables a high level of pre- and post-completion rate. Thus, one of the original demonstration sites had a 98% completion rate of their outcome measures (Clark et al., 2009). Since then, a completion rate of 91% has been achieved for the weekly measures across all services in routine care (Gyani, Shafran, Layard, & Clark, 2013). This is important as patients who fail to provide post-treatment outcome data do less well (Gyani et al., 2013). A report on the first million patient treated has been published (IAPT, 2012). The outcome scores may be aggregated across services to compare the performance of a service and whether this is associated with particular factors.

In addition to the weekly measures, a number of specific measures for anxiety disorders have been adopted as an alternative to the GAD-7 (Spitzer et al., 2006). The standard version of the OCI (Foa et al., 1998) (distress rating) is the measure adopted to monitor the outcomes in OCD. However, no national outcome scores for the IAPT service have yet emerged using the OCI in the treatment of OCD. One problem with the OCI is that there are 42 items requiring completion. This is approximately double the number of items compared with other disorder specific measures in IAPT such as the Social Phobia Inventory (SPIN) (Connor et al., 2000) which contains 17 items, or the Impact of Events Scale-Revised, for symptoms of Post-Traumatic Stress Disorder (Weiss & Marmar, 1997), which is comprised of 22 items. A self-report questionnaire may be especially problematic for some people with OCD who have problems of indecisiveness, not completing a questionnaire until

it feels "just right" or have re-reading or re-writing compulsions, all of which may increase the time taken. One option for IAPT and other clinical services may be to adopt the shorter OCI-R instead.

A good clinical outcome in IAPT currency is based on the comparison of pre-and post-treatment scores on the symptom measures for each patient. Under a payment by results scheme, part of the payment is triggered only when the degree of improvement exceeds the minimum that would be considered as reliable if it exceeds the measurement error of repeat reliability (Jacobson & Truax, 1991). This is calculated as ≥ 32 on the OCI (distress only) (http://www.iapt.nhs.uk/pbr/currency-model-description/clinical-outcomes/). If change exceeds this amount, the size of the payment depends on how far the person has moved towards recovery by the number who no longer achieve "caseness". Caseness is the threshold at which it is appropriate to initiate treatment in IAPT and defined as ≥40 on the OCI. A patient is deemed to have then "recovered" in IAPT if they have moved from a score of caseness or above pre-treatment to below caseness post-treatment.

Another option is for a service to adopt an even shorter version of the OCI-R, the OCI-R Main (Abramowitz et al., 2005), which consists of the highest scoring subscale of the OCI-R. There are 6 subscales (washing, checking, ordering, obsessing, hoarding, neutralizing) on the OCI-R and each subscale has just 3 items. Therefore the highest scoring subscale can be used as the pre-post measure. Abramowitz et al. (2005) evaluated the sensitivity to change and specificity of response to the OCI-R and the OCI-R Main in 77 patients who received CBT. They found that the OCI-R was sensitive to pre-post change and that the changes reflected improvement in OCD and related symptoms of depression, anxiety, and global functioning. In this study, the empirically derived cut-off to determine clinically significant improvement in the OCI-R was a change score of ≥ 21 and for the OCI-R Main, ≥ 8 (Abramowitz et al., 2005). Whatever version of the OCI is adopted, it is important to be

confident in validity and sensitivity to change before proposing to adopt the OCI-R or OCI-R Main more widely instead of the OCI and that it is sufficiently sensitive to change for a fair payment by results.

A higher level of stepped care is available for those patients who are considered to have severe treatment refractory OCD (Drummond et al., 2008). Patients in this category are either treated as out-patients, or may be admitted to a residential unit (Veale et al., 2015) or in-patient care (Boschen, Drummond, Pillay, & Morton, 2010). To access this stream of state funding the patient must have a Yale-Brown Obsessive-Compulsive Scale (Y-BOCS) (Goodman et al., 1989) score of 30 or above, and have failed two trials of CBT with exposure and response prevention of adequate duration, two trials of SSRI or clomipramine at adequate dose and duration, and one trial of augmentation of the SSRI. In this out-patient service, they typically receive 16-24 sessions of CBT by an experienced therapist, often supplemented by a home visit or family interventions. Some patients in this sample may have their medication optimized near the beginning of treatment.

The aim of this study was therefore to evaluate the OCI, the OCI-R and the OCI-R Main in two samples – one with OCD of moderate severity in an IAPT setting and one with severe treatment refractory OCD. The same dataset was used for all versions of the OCI and allowed comparison of the effect size in each version. As far as we are aware, this is the first study to use all versions of the OCI in the same dataset to examine sensitivity to change. The specific aims of this study were therefore to determine (1) which of the different versions of the OCI, the OCI-R, or the OCI-R Main are sensitive to change in two samples of OCD patients, (2) to compare sensitivity to change in the severe treatment refractory service with the observer rated Y-BOCS (Goodman et al., 1989), (3) to recommend a cut-off score on the OCI-R for the definition of caseness in the IAPT currency.

Method

Participants

All patients had a diagnosis of obsessive-compulsive disorder as their main problem (American Psychiatric Association, 2000). There were two out-patient samples seen for treatment at the Centre for Anxiety Disorders and Trauma (CADAT) at the Maudsley Hospital: (a) those attending as part of an IAPT service (equivalent to primary care) and (b) those attending as part of a severe treatment refractory service (equivalent to tertiary care). Both samples had a diagnosis of OCD using a Structured Clinical Diagnostic Interview for DSM-IV (First, Spitzer, Gibbon, & Williams, 2002).

The mean age for patients in the IAPT sample was 32.9 years (*SD* 10.17) with an age range from 19 to 57 years old, while for patients in the severe treatment refractory service the mean age was 34.75 years (*SD* 10.28) with a range of 17 to 58 years old. The average length of treatment in the IAPT sample was 14.76 sessions (*SD* 3.89) with a minimum number of sessions of 9 and a maximum of 26. In the severe treatment refractory service the average length of treatment was 21.93 sessions (*SD* 8.59) with a minimum of 6 sessions and maximum of 58 sessions. All other demographic details are shown in Table 1.

Measures

(1) The OCI (Foa et al., 1998) is an 84 item measure (42 for distress; 42 for frequency) with a caseness cut-off of ≥40 which a respondent rates on a 5-point Likert scale. There are 7 subscales (washing, checking, doubting, ordering, obsessing, hoarding, and neutralizing). Scores may range from 0-168 for the distress scale. The repeat reliability was 0.87 and the mean (*SD)* in the community control sample was 25.25 (20.80). The Cronbach's alpha was .87 in our IAPT sample and .90 in our severe treatment refractory sample.

(2) The OCI-R (Foa et al., 2002) is a short version of the original OCI, consisting of 18 items. There are 6 subscales (washing, checking, obsessing, hoarding, neutralizing, and ordering) with three items in each subscale. The range of scores is 0-72 and the repeat

reliability is 0.82 in a clinical sample and 0.84 in a community sample. The mean (*SD*) score for community controls on the OCI-R is derived from an average of two samples and was 14.23 (10.16) (Abramowitz et al., 2005). The Cronbach's alpha for the OCI-R was .73 in our IAPT sample and .82 in our severe treatment refractory sample. A caseness cut-off of ≥14 is suggested for the OCI-R in differentiating OCD from another disorder (Abramowitz & Deacon, 2006). However, this is the same score as the mean for the community controls above.

(3) The OCI-R Main (Abramowitz et al., 2005) consists of the highest (most severe) subscale for each individual at pre-treatment. There are three items for one sub-scale on the OCI-R Main, with a possible score ranging from 0 to 12. In 14 cases in the IAPT sample and in 18 cases in the severe treatment refractory sample, two or more sub-scales tied for the highest score at pre-treatment (i.e., the patient had multiple main symptoms). For these individuals the post-treatment OCI-R main score was computed as the mean of the corresponding post-treatment subscale scores. We calculated the mean of all the highest subscales post-treatment as was done in Abramowitz et al. (2005). Tolin, Woods, and Abramowitz (2003) reported the mean (*SD)* OCI-R Main score in a normative sample of 5.31 (2.6). The Cronbach's Alpha for the highest subscales in the IAPT sample was as follows: Washing 0.89 (*n* = 14); Checking 0.67 (*n* = 20); Ordering 0.80 (*n* = 7); Obsessions 0.31 (*n* = 31); Hoarding 0.94 (*n* = 3); Neutralizing 0.73 (*n* = 4).

The Cronbach's Alpha for the highest subscale in the severe treatment refractory sample was as follows: Washing 0.71 (*n* = 27); Checking 0.76 (*n* = 16); Obsessions 0.83 (*n* = 43). Cronbach's Alpha could not be calculated for the Ordering, Hoarding, or Neutralizing subscales as there was insufficient variance in the items on these scales.

(4) The Y-BOCS (Goodman et al., 1989) is a widely used observer-rated scale for OCD. It consists of 10 items and has a range of 0-40 with higher scores reflecting greater

symptomology. The Cronbach's alpha was .74 in our severe treatment refractory sample. The non-clinical sample reported by Steketee, Frost, and Bogart (1996) had a mean score of 7.2 (*SD* = 4.5) and a repeat reliability of 0.88. The cut-off change score for clinically significant improvement is therefore ≥ 16 for the Y-BOCS, using criterion c (Jacobson & Truax, 1991).

Fisher and Wells (2005) argue however that appropriate normative data on a representative non-clinical population is not available for the Y-BOCS, as studies that have investigated this are comprised of very small, female-only, undergraduate samples (Frost, Steketee, Krause, & Trepanier, 1995; Steketee et al., 1996). Small samples are said to be unreliable estimates of general population parameters (Kendall, 1999), and using an all-female undergraduate sample as the normative reference group would violate a central premise of the Jacobson approach, namely that non-clinical populations should be similar to clinical populations, except with regard to the presenting problem. In addition, a comprehensive screening for OCD and other psychiatric disorders did not take place in the student samples within these studies. The presence of OCD and other psychiatric disorders among students could therefore spuriously inflate scores on the Y-BOCS. In summary, they argue that data on an unscreened all female undergraduate sample does not represent an adequate representative functional population to determine criterion "c" in the Jacobson approach. We therefore also calculated the numbers who achieved an alternative criterion of a 35% reduction on the Y-BOCS as this does not require normative data (Farris, McLean, Van Meter, Simpson, & Foa, 2013). The Farris study found that this translates into a cut-off change score of ≤ 12 by symptom remission on the Clinical Global Impression Severity scale (Guy, 1976), and by a good quality of life as measured by the Quality of Life Enjoyment and Satisfaction Questionnaire (Endicott, Nee, Harrison, & Blumenthal, 1993) and a high level of adaptive functioning. In addition, due to recent developments in the literature that suggest

new ranges for Y-BOCS scores (Storch et al., 2015), we also reanalyzed the data to look at how OCI and OCI-R scores in our sample relate to these new ranges on the Y-BOCS.

(5) The PHQ-9 (Lowe et al., 2004) is a 9-item self-report measure of depression. Each item is scored from 0 "not at all" to 3 "nearly every day", and the summed total score ranges from 0 to 27 with higher scores reflecting greater symptomology of depression. Cronbach's alpha for the scale is .89. The Cronbach's alpha was .88 in the IAPT sample and .84 in the severe treatment refractory sample.

(6) The GAD-7 (Spitzer et al., 2006) is a 7-item self-report measure for symptoms of generalized anxiety. Each item is scored from 0 to 3 and a summed total score ranges from 0 to 21, with higher scores reflecting greater symptomology. Cronbach's alpha for the measure is .92. The Cronbach's alpha was .93 in the IAPT sample and .82 in the severe treatment refractory sample.

(7) The Work and Social Adjustment Scale (Mundt et al., 2002) is a 5-item scale of functional impairment relating to work ability, home management, private leisure activities, and the ability to form and maintain close relationships. Each question is rated on a 0 "no impairment" to 8 "very severe impairment" scale. The Cronbach's alpha was .78 in the IAPT sample and .71 in the severe treatment refractory sample.

Procedure

Patients in both samples completed all the self-report questionnaires at baseline and post-treatment. The Y-BOCS was completed only in the severe treatment refractory sample at pre- and post-treatment. The effect size was compared to whether participants achieved reliable improvement, no change or clinically significant change on the pre-and post-scores on each of the three versions of the OCI. In addition, we compared the numbers who achieved reliable improvement, no significant change and clinically significant change and 35% reduction on the Y-BOCS in the severe treatment refractory sample. To calculate the

numbers achieving reliable and clinically significant change, we used our own mean and standard deviation from our respective clinical samples.

Statistical Analysis

Data for the IAPT and severe treatment refractory sample was skewed and non-symmetrical; therefore sign tests were performed between pre-and post-outcome measures. Due to the number of tests, the overall alpha level was adjusted using Bonferroni correction, resulting in a target significance of 0.006. The effect size was calculated using Hedges *g*. Correlations were performed on pre-treatment measures for both the IAPT and severe treatment refractory samples to investigate relationships between these measures.

Results

In our IAPT sample, 60 patients (95.2%) out of the total sample of 63 patients met pre-OCI caseness of ≥ 40. The three patients who did not meet caseness scored 30, 37 and 39 on the OCI. 61 (96.8%) of 63 patients met pre-OCI-R caseness of ≥ 14 and the two patients who did not meet caseness scored 12 and 13 on the OCI-R. In the severe treatment refractory sample, 69 patients (94.5%) out of a total sample size of 73, met pre-OCI caseness of ≥ 40. The OCI and Y-BOCS scores of those 4 patients who did not meet caseness scored 34 on the OCI (with a Y-BOCS 30), 35 on the OCI (Y-BOCS 28), 37 on the OCI (Y-BOCS 35) and 39 on the OCI (Y-BOCS 27). 72 (98.6%) met pre-OCI-R caseness of ≥ 14, with the one patient who did not meet caseness scoring 12 on the OCI-R (Y-BOCS 30). The two s with Y-BOCS scores of less than 30 were re-referrals for some additional sessions, and were therefore seen in the treatment refractory service despite having a Y-BOCS score of < 30. However, for some individuals there is a clear discrepancy between those scoring in the severe range on the Y-BOCS and yet were not defined as a case on the OCI or OCI-R.

Table 2 shows the pre- and post- treatment outcome data with the effect size and 95% confidence intervals in the IAPT sample. Of note is that the effect size on the OCI (1.64) and

OCI-R (1.47) in the IAPT service was virtually identical. However, the effect size on the OCI-R Main was larger at 2.70. There were slightly smaller decreases for the effect size on the PHQ-9, GAD-7 and WSAS of between 0.83-1.11.

Post-treatment, there was a larger discrepancy between the OCI and OCI-R in the numbers who achieved reliable change and no longer met caseness for OCD. 44 patients (69.8%) from the IAPT sample no longer met caseness (cut-off < 40) resulting in a 73.3% recovery rate. However, post-treatment when using the OCI-R, 33 IAPT patients (52.4%) no longer met caseness (cut-off < 14) giving a 54.1% recovery rate.

Table 3 shows the pre- and post-treatment outcome data with the effect size in the severe treatment refractory sample. Again, the effect size on the OCI (0.93) and OCI-R (0.88) were very similar, while the effect size of the OCI-Main was larger at 1.69. Of note is that the Y-BOCS was more sensitive to change than the OCI with an effect size of 2.21 in the severe treatment refractory sample. The effect size on the PHQ-9, GAD-7 and WSAS were between 0.95 and 1.12, and therefore were more similar to the OCI in this sample.

Table 4 shows the percentage that achieved reliable improvement, clinically significant change (CSC), recovery, reliable change and recovery, and no reliable change in the IAPT sample. Of note is that a larger number achieved recovery on the OCI than the OCI-R. There were 37 patients (58.7%) who achieved reliable change and recovery as measured by the OCI. However, only 27 patients (42.9%) achieved reliable change and recovery as measured by the OCI-R.

For the OCI, the cut-off change score for achieving clinically significant improvement was ≥ 48 and the reliable change score within our IAPT sample was calculated to be ≥ 24. Note that IAPT recommend a slightly higher reliable change score for the OCI of ≥ 32. This cut-off is likely to be based on a pre-treatment *SD* of 31.9 for the OCD clinical sample (Foa et al., 1998), whereas our calculation used *SD* = 23.6 from our pre-treatment IAPT sample. If

the higher IAPT cut-off was used, then the numbers who achieve reliable change would decrease from $n = 47$ (76.2%) to $n = 39$ (61.9%).

For the OCI-R, the cut-off change score for achieving clinically significant improvement was ≥ 22 and the reliable change score was calculated to be ≥ 13.

Table 5 shows the percentage that achieved reliable improvement, clinically significant change, recovery, reliable change and recovery, and no reliable change in the severe treatment refractory sample. The reliable change score on the OCI within the severe treatment refractory sample was calculated to be ≥ 28, and the cut-off change score for achieving clinically significant change was ≥ 51. The reliable change score on the OCI-R within the severe treatment refractory sample was calculated to be ≥ 15, and the cut-off change score for achieving clinically significant change was ≥ 24.

On the OCI-R Main, the reliable change score within the severe treatment refractory sample, was calculated to be ≥ 2 and the cut-off change score for achieving clinically significant change was ≥ 9. There was a small discrepancy (2.7%) between the percentage achieving clinically significant improvement on the OCI (35.6%) and the OCI-R (32.9%). There was a slightly larger discrepancy for the percentage achieving reliable improvement, with 49.3% on the OCI and 38.4% on the OCI-R (because these are calculated with different repeat reliability scores). Again the percentage that achieved clinically significant change was approximately 30% higher on the OCI-R Main, which mirrors the findings on the overall effect size.

For the Y-BOCS, the reliable change score was calculated to be ≥ 4 and the cut-off change score for achieving clinically significant improvement was ≥ 21. 41 patients (59.4%) in the severe treatment refractory sample achieved a 35% reduction on the Y-BOCS. This compares to $n = 50$ (72.5%) who achieved clinically significant change.

Of note is that there was a discrepancy between the OCI and OCI-R in the numbers achieving non-caseness for the severe treatment refractory sample: 30 patients (41.1%) no longer met caseness on the OCI post-treatment (cut-off < 40), while on the OCI-R, 21 patients (28.8%) no longer met caseness post-treatment (cut-off < 14) resulting in a 29.2% recovery rate. Because of the discrepancy between the OCI and OCI-R on the numbers who achieve recovery, we conducted a sensitivity analysis of different cut-off scores for both the IAPT and treatment refractory sample (Table 6). A higher cut-off score of ≥ 17 on the OCI-R meant that the recovery rate approached that of the OCI.

In addition, the correlations between the different measures are shown in the IAPT sample (Table 7) and in the severe treatment refractory sample (Table 8). Of note is that the correlation between Y-BOCS and the OCI or OCI-R is significant but relatively low (0.24-0.26). A higher correlation occurs with the PHQ9 (0.45).

Lastly, we computed new analyses to investigate the mean and standard deviation of the OCI and OCI-R scores in relation to the recommended ranges for the Y-BOCS (Storch et al., 2015). This can be seen in Table 9. Both the mean OCI and OCI-R follow the steps in severity for the Y-BOCS but there is high degree of variance within the OCI.

Discussion

We calculated the numbers who achieved reliable and clinically significant change and effect size of the OCI and OCI-R from two clinical samples with OCD who differed according to severity. We were also able to validate the OCI and OCI-R against the YBOCS in the sever treatment refractory sample. Both samples had a very similar effect size on the OCI and OCI-R in terms of the mean change after treatment and to a lesser extent in the percentage that achieved clinically significant change. The only difference was that the severe treatment refractory sample showed a slightly larger discrepancy between the OCI and OCI-R in terms of the percentage that made reliable improvement after treatment. This is

likely to be related to the repeat reliability of the OCI being 0.87 in the first study (Foa et al., 1998) and of the OCI-R to be 0.82 in the subsequent study (Foa et al., 2002). This is likely to produce a margin of error for different samples as slightly lower repeat reliability in the OCI-R has a significant impact on the numbers who achieve reliable improvement. For example, in the severe treatment refractory sample the numbers who achieved reliable improvement on the OCI-R would increase from 28 (38.4%) when the repeat reliability is 0.82, to 33 (45.2%) if the reliability was 0.87 (the same for the OCI). The higher reliability score would then mean less discrepancy between the percentage who achieve reliable improvement on the OCI (49.3%) and OCI-R (38.4%).

This is the first study to directly compare the OCI and OCI-R using the same dataset. Our conclusion is that there does not seem to be any extra benefit from using the OCI over the OCI-R for measuring outcome in a service evaluation such as IAPT. The OCI-R has a significant advantage over the OCI with 24 fewer items to complete. This may be especially important for those people with OCD who struggle to complete a questionnaire in the context of a service like IAPT where a weekly measure is requested with the standard data set.

Our data appears generalizable to other published studies that have used the OCI and OCI-R. For example, our IAPT sample had a pre-treatment mean of 73.06 (*SD* = 23.57) on the OCI, which compared reasonably to 71.00 (*SD* = 23.39) in Oldfield, Salkovskis, and Taylor (2011) and 64.61 (*SD* = 18.28) in Rowa et al. (2007). The effect size (*g*) was 1.64 in our IAPT sample and this was good compared to 0.97 in Rowa et al. (2007) with home-based CBT, and similar to 1.39 in Oldfield et al. (2011) with intensive CBT.

The mean score pre-treatment on the OCI-R in the IAPT sample was 30.58 (*SD* = 10.72), which compares favorably to other clinical studies, such as Abramowitz et al. (2005) which was 29.10 (*SD* = 11.7) and Foa et al. (1998) which was 28.00 (*SD* = 13.5). The effect size on the OCI-R was 1.47 in our IAPT sample and this compares with 1.27 in Abramowitz

et al (2005) and 0.85 in Simpson et al. (2008). The cut-off score for achieving clinically significant change on the OCI-R was ≥ 22, which is comparable to cut-off reported in Abramowitz et al. (2005) of ≥ 21. For the OCI-R Main average scores, the cut-off score for achieving clinically significant change was ≥ 8; again in line with the OCI-R Main clinical cut-off of ≥ 8 reported in Abramowitz et al. (2005).

We have also considered the use of the OCI-R Main in a clinical service. Focusing on the highest scoring subscale appears to lead to increased sensitivity to change and this may appear to be a viable option. The number of items to be completed depends on whether there is a tie in the score before treatment and in our samples could range between 3 and 12. The OCI-R Main score pre-treatment was 10.60 (*SD* = 1.81) in the IAPT sample compared to 10.48 (*SD* = 2.3) in Abramowitz et al (2005). Our IAPT sample had an effect size of 2.70 and this compares to 2.11 in Abramowitz et al (2005). However, the internal reliability alpha could not be calculated for three domains because of insufficient variance in the severe treatment refractory sample and had a very low Cronbach's alpha on one domain in the IAPT sample. The advantage of a short and more sensitive scale needs to be weighed against one which may be more sensitive to response bias and has other threats to reliability and validity. We would be therefore cautious about using this shortened scale as an outcome measure. In addition, there is no information on repeat reliability which is required for calculation of reliable change.

Caseness on the OCI is the threshold at which it is appropriate to initiate treatment in IAPT. However, there are patients seen for treatment that did not quite meet caseness pre-treatment. For example, in our IAPT service, 26 patients were seen for treatment and discharged in the period April 2014 - March 2015. Although all of these patients met criteria for OCD on the Structured Clinical Interview for DSM-IV, four (15%) of them did not meet the IAPT caseness cut-off of ≥ 40 on the OCI at assessment.

Furthermore, the numbers in the IAPT service who no longer met clinical caseness (50.8%) and reliable improvement (65.1%) on the OCI-R is lower compared to the OCI (66.7% and 76.2% respectively), which is important when a service is paid by results. Increasing the cut-off score to ≥ 17 on the OCI-R in the IAPT sample would mean the number who recovered increases to 37 (58.7%) and this would seem to be a better compromise. A similar finding was found in the severe treatment refractory sample when the OCI-R cut-off was increased to ≥ 17. Further research is required using a Receiver Operating Characteristic (ROC) to compare a Structured Diagnostic Interview for OCD against the OCI and OCI-R to establish the optimal cut-off for caseness. In the meantime, we would recommend a cut-off score of ≥ 17 on the OCI-R for caseness in the IAPT currency.

Alternatively, this raises the question as to whether a clinical service should adopt a different self-report measure that is more sensitive than the OCI. For example, Storch et al. (2007) developed a 5-item self-report measure, the Florida Obsessive Compulsive Inventory (FOCI). It measures the domains of time, distress, control, avoidance and interference in life from the obsessions and compulsions. Aldea, Geffken, Jacob, Goodman, and Storch (2009) examined the effect size in 89 people with OCD with FOCI, OCI-R and the Y-BOCS. They found a smaller effect size of treatment of 0.88 on the OCI-R compared to our IAPT sample (1.47), but more similar to our severe treatment refractory sample (0.88). Of note is that the FOCI had a higher effect size of 1.33 in this sample and this instrument may be a better compromise as a self-report outcome measure that is sensitive to change and is only 5 items long. However, it is not yet possible to calculate the number that achieve reliable change, as there is no repeat reliability data in a clinical or normative sample.

Limitations

A limitation in our data is the use of the observer-rated Y-BOCS in a clinical service. The clinician who conducts the treatment also administers the Y-BOCS. They are not

therefore blind to the treatment administered and may have an interest in getting the best possible result. This may introduce a bias (that is, the scores are deflated by clinicians at post-treatment) and increase the effect size. This may partly account for the low correlation between the Y-BOCS and OCI or OCI-R.

The Y-BOCS also measures different domains to the OCI. The OCI is a self-report measure of one domain (distress) which may not be the best way of operationalizing symptom severity or change over time. The Y-BOCS measures time, distress, handicap, resistance and degree of control over target obsessions and compulsions. This discrepancy in effect size between the Y-BOCS and the OCI or OCI-R has been noted before. For example, the effect size for the Y-BOCS in Aldea et al. (2009) was 2.64, compared to 0.88 on the OCI-R in their sample. This is comparable to the discrepancy in our severe treatment refractory sample. However, it should be emphasised that self-report and observer–rated measures are like two sides of a coin. One is not better than the other, but are complementary. However, it may be important to compare self-report measures in OCD as one may be more sensitive than another.

Conclusions

The sensitivity to change of the OCI and OCI-R are very similar and we would recommend using the shorter OCI-R over the OCI when treatment outcome scores are required. The effect size of the OCI-R Main is larger and this would appear to be a viable option as an outcome measure if even fewer items are required. Further research is required to determine the optimal cut-off score for caseness in the OCI-R but in the meantime we would recommend a cut-off of ≥17.

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Table 1.
Demographic information for patient in both IAPT and severe treatment refractory services

		IAPT (n = 63)		Severe treatment refractory sample (n = 73)	
		n	*%*	*n*	*%*
Gender	Female	29	46.0	37	50.7
	Male	34	54.0	36	49.3
Ethnicity	Black (Caribbean, African, Other)	2	3.2	0	0
	Caucasian	47	74.6	42	57.5
	Indian/Pakistani/Bangladeshi	2	3.2	1	1.4
	Pacific Asian	1	1.6	1	1.4
	Mixed	3	4.8	0	0
	Other	2	3.2	3	4.1
	Not stated	6	9.5	10	13.7
	Not known	0	0	1	1.4
	Missing	0	0	15	20.5
Marital Status	Married	10	15.9	22	30.1
	Living as if married	18	28.6	2	2.7
	Divorced	3	4.8	2	2.7
	Separated	1	1.6	0	0
	Never married	29	46	43	58.9
	Missing	2	3.2	4	5.5

Table 2.
Analysis of IAPT pre and post treatment scores (Sign test)

Measure	*n*	Pre-Treatment Score		Post-Treatment Score		*p*	Effect Size *(Hedges g)*	CI (95%)
		Mean	*SD*	Mean	*SD*			
PHQ-9	62	11.40	6.73	6.17	5.95	.001***	0.83	[-0.28, 1.94]
GAD-7	62	12.53	6.45	6.10	5.12	.001***	1.11	[0.10, 2.13]
WSAS	62	19.71	7.78	11.32	9.24	.001***	0.99	[-0.50, 2.48]
OCI	63	73.06	23.57	33.30	25.34	.001***	1.64	[-2.60, 5.88]
OCI-R	63	30.58	10.72	14.58	11.17	.001***	1.47	[-0.42, 3.37]
OCI-R Main	63	10.60	1.81	3.89	3.05	.001***	2.70	[2.26, 3.13]

*Note: IAPT = Improving Access to Psychological Therapies; PHQ-9 = Patient Health Questionnaire; GAD-7 = Generalised Anxiety Disorder Assessment; WSAS = Work and Social Adjustment Scale; OCI = Obsessive Compulsive Inventory; OCI-R = Obsessive Compulsive Inventory- Revised. *** p values = .000, rounded to .001*

Table 3.
Analysis of severe treatment refractory service pre and post treatment scores (Sign test)

Measure	*n*	Pre-Treatment Score		Post-Treatment Score		*p*	Effect Size *(Hedges g)*	CI (95%)
		Mean	*SD*	Mean	*SD*			
PHQ-9	68	16.00	6.16	9.64	6.13	.001***	1.04	[0.02, 2.07]
GAD-7	68	15.28	4.39	9.79	5.41	.001***	1.12	[0.30, 1.95]
WSAS	73	27.56	6.91	19.26	10.29	.001***	0.95	[-0.46, 2.37]
OCI	73	85.87	27.59	57.06	34.58	.001***	0.93	[-4.11, 5.97]
OCI-R	73	35.57	12.73	23.44	14.97	.001***	0.88	[-1.36, 3.12]
OCI-R Main	73	11.37	1.26	6.88	3.56	.001***	1.69	[1.26, 2.12]
Y-BOCS	71	32.24	3.61	17.96	8.48	.001***	2.21	[1.14, 3.27]

*Note: PHQ-9 = The Patient Health Questionnaire; GAD-7 = Generalised Anxiety Disorder Assessment; WSAS = Work and Social Adjustment Scale; OCI = Obsessive Compulsive Inventory; OCI-R = Obsessive Compulsive Inventory- Revised; Y-BOCS = Yale-Brown Obsessive Compulsive Scale. *** p values = .000, rounded to .001*

Table 4.
Numbers achieving Reliable and Clinically Significant Change in IAPT service

Measure	Total *(n)*	Reliable Change		Clinically Significant Change		Recovered		Reliable Change and Recovered		No Reliable Change	
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
OCI	63	47	76.2	40	68.3	42	66.7	37	58.7	16	23.8
OCI- R	63	41	65.1	36	57.1	32	50.8	27	42.9	21	33.3
OCI-R Main	63	56	88.9	52	82.5	-	-	-	-	7	11.1

Note: OCI = Obsessive Compulsive Inventory; OCI-R = Obsessive Compulsive Inventory- Revised; IAPT = Improving Access to Psychological Therapies

Table 5.
Numbers that achieve Reliable and Clinically Significant Change and recovery in the severe treatment refractory service

Measure	Total *(n)*	Reliable Change		Clinical Significant Change		Recovered		Reliable Change and Recovered		No Reliable Change	
		n	*%*	*n*	*%*	*n*	*%*	*n*	*%*	*n*	*%*
OCI	73	36	49.3	26	35.6	28	38.4	21	28.8	37	50.7
OCI-R	73	28	38.4	24	32.9	21	28.8	17	23.3	44	60.3
OCI-R Main	73	53	72.6	50	68.5	-	-	-	-	19	26.0
Y-BOCS	69	61	88.4	50	72.5	-	-	-	-	7	10.1

Note: OCI = Obsessive Compulsive Inventory; OCI-R = Obsessive Compulsive Inventory- Revised; Y-BOCS = Yale-Brown Obsessive Compulsive Scale

Table 6.
Sensitivity analysis for cut-offs for recovery on the OCI-R

OCI-R cut-off score	Recovered			
	IAPT (n = 63)		Severe treatment refractory sample (n = 73)	
	n	%	*n*	%
≥13	32	50.8	18	24.7
≥14	32	50.8	21	28.8
≥15	37	58.7	21	28.8
≥16	37	58.7	25	34.2
≥17	37	58.7	27	37.0

Note: OCI-R = Obsessive Compulsive Inventory- Revised; IAPT = Improving Access to Psychological Therapies

Table 7.
Correlations between pre-treatment scores in the IAPT service

Pre-treatment scores	1	2	3	4	5	6
1. PHQ-9	-					
2. GAD-7	.71**	-				
3. WSAS	.47**	.48**	-			
4. OCI	.27**	.25*	.22	-		
5. OCI-R	.18	.15	.17	.89**	-	
6. OCI-R Main	.13	.08	.16	.39**	.40**	-

*Note: IAPT = Improving Access to Psychological Therapies; PHQ-9 = Patient Health Questionnaire; GAD-7 = Generalised Anxiety Disorder Assessment; WSAS = Work and Social Adjustment Scale; OCI = Obsessive Compulsive Inventory; OCI-R = Obsessive Compulsive Inventory- Revised; **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).*

Table 8.
Correlations between pre-treatment scores in the severe treatment refractory service

Pre-treatment scores	1	2	3	4	5	6	7
1. PHQ-9	-						
2. GAD-7	.56**	-					
3. WSAS	.38**	.23	-				
4. OCI	.39**	.22	.16	-			
5. OCI-R	.34**	.15	.15	.87**	-		
6. OCI-R Main	.37**	.32**	.09	.31**	.27*	-	
7. Y-BOCS	.45**	.34**	.30*	.26*	.24*	.29*	-

*Note: PHQ-9 = Patient Questionnaire; GAD-7 = Generalised Anxiety Disorder Assessment; WSAS = Work and Social Adjustment Scale; OCI = Obsessive Compulsive Inventory; OCI-R = Obsessive Compulsive Inventory- Revised; Y-BOCS = Yale-Brown Obsessive Compulsive Scale; **Correlation is significant at the 0.01 level (2-tailed); *Correlation is significant at the 0.05 level (2-tailed).*

Table 9.
Mean (SD) pre and post treatment OCI and OCI-R scores compared to Storch et al (2015)'s Y-BOCS cut-off scores for patients in the severe treatment refractory service.

Y-BOCS score	Pre					Post				
	OCI			OCI-R		OCI			OCI-R	
	n	Mean	*SD*	Mean	*SD*	*n*	Mean	*SD*	Mean	*SD*
0 - 13	0	-	-	-	-	19	34.16	28.06	14.58	12.28
14 - 25	2	73.00	45.25	31.50	13.44	37	56.16	28.26	23.91	12.66
26 - 34	48	83.75	23.86	34.27	11.47	12	87.92	28.57	33.67	16.28
35 - 40	19	91.32	34.11	38.55	14.26	1	110.00	-	42.00	-

Note: Y-BOCS = Yale-Brown Obsessive Compulsive Scale; OCI = Obsessive Compulsive Inventory; OCI-R = Obsessive Compulsive Inventory- Revised; - = at pre-treatment no participants scored between 0-13 on the Y-BOCS, at post-treatment only one participant scored between 35-40 on the Y-BOCS.